REPORT ON THE BINGLEY CLEAN MILK CAMPAIGN 1925.

INTRODUCTION.

This report describes a campaign recently conducted within the area of the Bingley Urban District Council by the local Public Health Department working in conjunction with the Department of Agriculture of Leeds University.

The chief aim of the scheme was to interest the farmer, milk distributor, and consumer alike in the need for a wholesome and reliable milk supply and to induce all concerned to do their share in protecting this valuable commodity from preventable contamination.

It was felt that to secure any real and lasting improvement the campaign shoukd be conducted on educational and co-operative lines.

The scheme was initiated as a result of the attendance of Mr.W.E.Cooke,M.I.H,.M.S.I.A,. the Senior Sanitary Inspector of Bingley at a Course on Clean Milk Production for Sanitary Inspectors' conducted at the University of Leeds in July,1925. This course was the first of its kind to be held in England and was attended by sixteen Inspectors. The syllabus included instruction on bacteriological work in connection with milk , lectures on the chemistry of milk and veterinary hygiene, and concluded with a number of visits to farms where up-to-date methods of milk production were practised. During this course the University Authorities indicated their willingness to assist Local Authorities, as far as possible, who desired to institute educational work in their areas in connection with clean milk production.

In view of this the Bingley Local Authority made arrangements with the Department of Agriculture of Leeds University to carry out the bacteriological examination of milk samples, and to assist in educative work in their areas.

In September 1925 the Public Health Committee of the Bingley Urban District Council considered a special report presented by their Inspector on the subject of a clean milk supply, This report concluded with the following recommendations:-

1. That educative work be undertaken amongst the milk producers and distributors as to the methods necessary to secure clean milk. This work to be in form of illustrated lectures, personal visits and talks on the farms, and the issue of suitable literature.
2. That steps be taken forthwith to submit frequent samples of milk from local producers to the Leeds University for bacterial count and examination for presence of dung organisms (Bacillus Coli Group)
3. That an endeavour be made to stimulate a demand for clean milk amongst the public, and local farmers be encouraged to apply for licenses to produce Graded Milk.
4. That steps be taken to educate milk consumers as to the proper care of milk in the home.

The report was carefully considered by the Public Health Committee who unanimously agreed to act on the recommendations, and the campaign commenced on October 6th,1925.

Before going on to describe the actual work of the scheme a brief description of the Bingley Urban District is necessary.

The area covers a section of the valley of the River Aire, and extends to 11,675 acres. The total population is 19,380 of whom about 12,000 reside in the town of Bingley itself. The remaining population live in villages, hamlets and scattered farms in the rural part of the district.

The total number of farmers engaged in milk production is 110 of whom 52 export their milk to neighbouring districts, the remainder supplying their own neighbourhood. There are 1,578 milch cattle in the area and these are housed in 209 cowsheds. Milk purveyors number 44 and these generally speaking deliver milk straight from the producer to the consumer. The estimated milk consumption of the inhabitants of the district was 1/3rd of a pint per head per day.

There were no producers or milk dealers under the Milk (Special Designations) Order, when the campaign commenced.

The Report consists of three parts:-

1. Report on visits to farms and educational work amongst producers:-contributed by Mr.A.Paton.B.Sc., N.D.A.,N.D.D., Assistant Lecturer in Dairy Husbandry, The University of Leeds.
2. Report on the Bacteriological Examination of Samples.-contributed by Mr.C.H.Chalmers,B.Sc.,N.D.A. Assistant Lecturer in Agricultural Botany,University of Leeds.
3. Report on educational work amongst the Consumers (by the writer)

1. REPORT ON VISITS TO FARMS.

The methods of carrying on the above scheme may be explained as follows. A list of the milk producers in the area was prepared, and arrangements made for one of the Sanitary Inspector's Staff to take samples of milk from each of these farms. A start was made with the sampling on 6th October,1925. The farms were visited during the afternoon milking, and the samples taken in sterile bottles. In most cases these samples were taken by the Inspector, stored in a cool room over-night, and dispatched to Leeds for Bacteriological examination on the following day. Where, owing to the time of milking, or difficulty of access of the farm, it was impossible for the Inspector to take the sample personally, a sterile bottle was left with the farmer and instructions given as to the method of sampling and the manner in which the milk should be kept overnight. Such samples were collected early the following morning and dispatche for examination along with those obtained by the Inspector.

The farmer was paid for the milk taken. Altogether 95 farms were visited and samples obtained.

When the examination of the samples had been made, each farmer was notified of his own result only, so that no dis-satisfaction should arise by comparison of one establishment with another. It was felt that the reports on the samples themselves would prove of little value to the farmers, if they were not followed up with comments and advice; with this in view, visits to the farms by the Senior Sanitary Inspector, and a member of the University Staff were arranged. On these visits, opportunity was taken to explain to the farmer the significance of the Report he had received on his sample, and to point out how improvement might be made; the general ~~s~~oubjects of the campaign were also explained.

The buildings on the farms visited, varied a great deal. One or two which had been built recently were very good, but many of the cowsheds are old buildings such as are in existence all over the country; narrow, badly lit, badly ventilated, and difficult to keep clean. One of the most striking defects was the lack on many farms of a milk room where the milk could be cooled or put in churns, and where the utensils could be stored between the milkings. Under such conditions the task of producing a good clean milk is an extremely difficult one, involving great labour in keeping the cows and the cowsheds clean. Like the cowsheds, the equipment on most of the farms was more or less what one finds on the average farm throughout the country.

Care had to be exercised when dealing with any matter requiring an outlay of money, particularly during the earlier stages of the campaign, as no guarantee could be given that additional care as regards cleanliness was going

to result in an increased price to the farmer for such clean milk. The advantages accuring from the improved keeping quality of the milk, were, however, fully pointed out. No suggestions were therefore made which would involve any large expenditure by the farmers either with regard to the buildings or the equipment, it being felt that such suggestions would not meet with approval, but upset the good will which was being engendered in the farmers towards the campaign. Stress was laid particularly on the cleanliness of the cowsheds, the cows, personal cleanliness of the milkers and the care of the utensils. Small items such as the advantages of using covered pails, and, where the cooler was situated in an exposed position, the advisability of fitting a cheap metal cover to prevent contamination by dust, etc., were mentioned.

The campaign was carried still further by a series of three lectures on Methods of Production of Clean Milk, and that the interest of the farmers had been aroused was shown by the very gratifying attendances at these meetings. The lectures in each case were illustrated with lantern slides and were followed by discussions which lasted well over an hour on each occasion. A lecture on the "Handling of Milk", for the distributors of milk in the area was also arranged, and this was likewise very well attended.

It must be admitted that some difficulties were experienced at the commencement of the campaign. The farmers were of the opinion that such supervision in their area, e.g. the taking of samples, was unfair, when those producers outside the area were not being treated in a similar way.

When the visits were paid and the whole idea of the scheme explained, this attitude was, in large measure, changed to one of enthusiasm and willingness to carry things out.

There is no doubt that the educational work carried out in this district has aroused considerable interest in the matter of clean milk production among both the producers and the distributors of milk. Many have expressed their willingness to co-operate as far as possible in supplying a clean milk to the consumer.

On some of the farms, distinct improvements in both methods and equipment have been shown. Regular grooming of the cows is now practised on many farms, as well as the daily washing of the cowshed floors. Several have adopted the use of covered milking pails and interest has been shown in the erecting of home made sterilisers. In view of the importance of sterilising the coolers , one or two farmers who have no steaming apparatus have commenced immersing the coolers in the copper or potpan, boiling them, and so rendering them sterile. Some of the milks which were cooled had given higher bacterial counts than the uncooled, and thus the importance of the cleanliness of the cooler and of the prevention of access of dust during cooling was made very evident.

It may be said that most of these improvements are small items; they are, however, steps in the right direction- all tending towards the production of a cleaner milk supply. When the second lot of samples was taken a general improvement in the cleanliness of the cows and

in methods was apparent in the lower bacterial counts obtained.

The scheme assumed in some measure, the aspects of a Clean Milk Competition, and as successive samples were taken, there was a growing keenness among the farmers to obtain their bacteriological reports, in order that they might see if they had improved upon their previous results.

A. PATON.

BACTERIOLOGICAL REPORT ON MILK SAMPLES.

The Meaning of the term "Clean Milk".

It is well known that ordinary milk even when produced under the cleanest possible conditions, contains many organisms or bacteria. These bacteria are minute forms of living matter which find their way into the milk along with particles of dust etc. They grow and multiply very rapidly in milk, producing in some cases undesirable odours and flavours and eventually causing the milk to become sour. The larger particles of dirt may be removed from the milk by straining, but the bacteria are so small that they easily pass through the finest sieve. For this reason, milk which has once become contaminated cannot be purified by straining. The greater the number of organisms present, the more rapidly do the objectionable changes mentioned take place. Generally speaking, the milk which will keep fresh and sweet the longest is the one which contains fewest bacteria. It has been found possible to produce milk which will keep sweet for three or four days even in the hottest weather; it is milk of this kind that is termed "clean milk".

"Clean Milk" that is, milk which is comparatively free from bacteria can be obtained either by preventing organisms from entering the milk, or by treating the milk in some way in order to destroy organisms which have gained access to it. Under certain circumstances the latter method has its advantages, but if the food value and normal flavour of the milk are to be preserved, the former method must be practised.

The Value of the Bacteriological Examination of Milk.

From what has been said it will be obvious that the only true test of the cleanliness of milk is to ascertain the number and nature of the bacteria present there-in. From this information it is possible to draw certain conclusions with regard to the conditions under which the milk has been produced, and the sources from which the bacteria have come. Moreover an approximate estimate of the numbers of organisms which have their origin in manure can be made. These bacteria belong to what is known as the Bacillus Coli group which rapidly cause souring of milk, and since they are sometimes associated with disease producing organisms, their presence in milk is very objectionable.

The Examination of the Samples.

Bacteriological examinations were made of two samples of milk from each farm. A report showing the results of the examination was duly forwarded to the farmer concerned, who was thus able to note the progress he was making.

Each sample was kept for about 24 hours at room temperature (60° F approx), before it was examined. This minimised to a great extent the influence of weather conditions and also formed a standard for the comparison of the results. In this connection it should be pointed out that two of the most important factors controlling the rate of growth and multiplication of bacteria in milk are. , (1) the length of the time the sample is kept and (2) the temperature at which the sample is kept before being examined. Within certain limits the higher the temperature or the longer the time, the greater is the multiplication of the organisms. If, therefore, the results here given are compared with those obtained elsewhere, the age and temperature of the sample at the time of the examination must be borne in mind.

Analysis of Results.

Samples of evening milk were taken from 15 to 25 farmers on two days of the same week and were sent the following morning for examination. These samples constitute a group, and five of such groups were examined . . They were called the "primary" samples, The "repeat" samples were taken in the same order as the primary ones, and thus group 6 compares with group 1, Group 7 with Group 2, and so on.

The results of the Bacteriological Examinations are shown in Table 1. A comparison of the primary with the repeat samples shows that a great improvement had been effected. Thus in Group 3, for example, the average bacterial content of the primary samples was over 2,000,000, while that of the corresponding repeat samples was only 52,500.

TABLE. I.

	Primary Samples October to November.			Repeat Samples. November to December.						
Group No.	1	2	3	4	5	6	7	8	9	10.
Av. temp. when tested.	60.5° F	60. 5° F	62° F	59. 5° F	58°. F.	59° F.	58° F	58° F	59° F	58°
Av. age when tested (in hours)	23	23	24½	24	23½	25	25	23	23	24½
Av. Bact. content per c.c.	921,626	551,913	2,107,292	1,247,560	392,800	259,580	94 2~~49~~,553	52,576	65,889	67,140
Av. Coli content	1/1000	1/100	1/1000	1/1000	1/100	1/1000	1/100	1/100	1/100	1/10
Av. Keeping quality.	37 hrs	41 hrs	29 hrs	38 hrs	38 hrs	62 hrs	6~~8~~8 hrs	66 hrs	75 hrs	80½

This great improvement is perhaps better shown in Table 11 which gives the final averages of all the primary samples as compared with those of the repeat samples.

TABLE 11.

	Of all Primary Samples.	Of all Repeat Sample
Average Bacterial content per c.c.	1,044,238.	147,947.
Average B.coli content	1/1000 c.c.	1/100 c.c.
Average Keeping Quality.	37 hours	70 hours.

It will be seen that the average temperature of the repeat samples was, on the whole, lower than that of the primary samples. This would account to some extent for the lower bacterial counts, although the whole of the improvement cannot be attributed to this. In order to form some idea as to the extent of the effect of the lower temperature of the repeat samples, it is helpful to examine the samples from five farms where the methods of production were not modified in any way.

The results of these samples are shown in Table 111.

Table 111.

The Results of Samples from farms where no change in methods was made.

	Primary Samples.					Repeat Samples.				
Farmer.	1.	2	3	4	5	1	2	3	4	5
Temp. when tested. F.	60°	60°	60°	61°	60°	58°	59°	58°	58°	58°
Age when tested, hours	23½	23½	23½	23	23	24	22	24	24	25
Bact. content per c.c.	544,000	616,000	2,128,000	200,000	460,000	520,000	830,000	1,330,000	450,000	1,030,000
B. Coli content.	1/1000	1/1000	1/100	1/10	1/10	1/100	1/1000	1/10,000	1/1000	1/100
Keeping Quality	40	40	38	40	40	40	40	32	40	36

	Primary Samples.	Repeat Samples.
Average bacterial content per c.c.	789,600.	832,000.
Average B.Coli content	1/100 c.c.	1/1000 c.c.
Average Keeping Quality.	37½ hours.	37½ hours.

It will be seen that no improvement has been made in the cleanliness of these samples, in fact their standard of cleanliness grew worse during the campaign.

Comparison of the samples with Grade "A" Standard.

The bacterial standard laid down for Grade "A" milk is that the milk must not contain more than 200,000 bacteria per cubic centimetre and no coliform organisms in 1/100 part of a cubic centimetre when delivered to the consumer. Here we have a reasonable basis for comparing the cleanliness of the samples submitted. The number of producers who reached this standard will be seen in Table 1V. It should be borne in mind, however, that Grade "A"Milk can only be sold when the producer holds a licence from the Local Authority and maintains the standard of cleanliness stipulated.

TABLE 1V.

	Primary Samples.					Repeat Samples.				
Group No.	1	2	3.	4	5	6	7	8	9	10
% Samples which did not reach Grade "A" standard.	91·3	83·4	87·5	61·6	52.2	52.6	50.0	35.3	33.3	31.0
Average percentage :	75.2					40.4				
% Samples within Grade A" standard.	8.7	16.6	12.5	38.4	47.8	47.4	50.0	64.7	66.6	69.0
Average percentage :	24.8.					59.6.				

From the above it will be seen that 59.6% of the Repeat samples came within Grade "A" standard. This is very encouraging and bears out the fact that milk of a very high standard of cleanliness can be produced on commercial lines, even by farmers who have comparatively poor buildings.

Presence of Dung Organisms (Bacillus Coli).

On the whole there has not been as the campaign progressed, a great reduction in the number of B.Coli organisms in the samples. These organisms produce most disagreeable taints and also rapid souring of the milk. The following table shows to some extent the improvement in the keeping quality of some of the samples of milk as a result of the reduction in the number of B.Coli organisms.

Those samples which had a bacterial count lying between eight-thousand and thirty-five thousand per cubic centimetre were arranged into groups according to the number of bacillus coli organisms which they contained.

TABLE V.

B.Coli Organisms.	Total bacterial count per c.c.	Keeping Quality in hours.
-1 c.c.	14,916.	84.3
+1 c.c.	22.060.	73.0
+1/10 .c.c	18,442	80.6
+1/100.c.c.	15,955	64,0

- sign means "not present in"
+ sign means "present in"

From this Table it will be seen that although the total number of organisms remains almost constant, the keeping quality of the milk decreases, to a certain extent, as the number of bacillus coli organisms increase

CONCLUSIONS.

The improvement in the average keeping quality of the milk and the reduction in the average number of organisms found in the repeat samples is, in itself, sufficient evidence of the interest which has been taken by the farmers in the campaign.

The bacteriological results of the samples show that milk with a low bacterial count and consequently of good keeping quality can only be produced when the cows are clean, the utensils sterilised, and the milk cooled. It is also of the greatest importance to arouse the interest of the milkers

with out their cooperation no real progress can be made. This interest can be stimulated by explaining to the milkers the reasons for the new methods and by giving them an opportunity to visit farms where they are being practised. Moreover, the farmer should have periodical bacterial counts made of his milk, and should show these to the workers, so that they may become acquainted with the results of their efforts.

C.H.CHALMERS.

EDUCATIONAL WORK AMONGST CONSUMERS.

The campaign was rounded off by the holding of a "Clean Milk Week" from February 20th to the 26th,1926. During the week a large number of lectures and talks, most of which were illustrated by means of lantern slides or films, were given to the inhabitants of the district. For this special week the Bingley Public Health Committee secured the very willing help of the National Milk Publicity Council of London, who sent two of their staff to give the lectures,etc. They loaned some excellent films and also sent some slides prepared by the National Clean Milk Society and the Chicago Dairy Institute. During the Clean Milk Week the public were told about food and food values, with especial reference to milk, and urged to excersise great care and to take proper precautio in looking after milk in their homes. One of the lecturers devoted most of her time to visiting the elementary schools wh she dealt with the subject of food values in a way to interest the children.

During the Clean Milk Week the lecturers spoke to ov 2,500 persons who manifested considerable interest.

In addition to these talks and lectures a leaflet o "How Milk Should be cared for in the Home" was sent to practically every home in the district and some 300 attractive coloured posters urging people to consume more milk were exhibited throughout the area.

SUMMARY OF RESULTS.

Before concluding this Report a summary of the results of the campaign may be of interest.

There can be no doubt but that the policy of sympathetic co-operation with the trade has been amply justified and more lasting improvements effected than mere recourse to legal pressure would have done. The marked improvement in methods, equipment, and general cleanliness of animals and cowsheds amply demonstrates the real interest shown by most of the farmers in the scheme. Many farmers for instance, who have commenced daily grooming of their cows say that they are more than repaid for their trouble by the improved health and contentment of their animals.

In January 1926 two local producers entered the Yorkshire Clean Milk competition. A local farmer has applied for a Grade "A" producer's license, while several other farmers have expressed their intention to apply for licenses if the public demand increases sufficiently. On the whole, the public have shown considerable interest in the scheme, and as evidence of this there is an increasing demand for Graded Milks. Two local dealers have already licenses to sell Grade "A" milk.

So that there shall be no lapse of interest on the part of the farmers generally the Public Health Committee have arranged with the University to continue the examination of a certain number of samples. Individual results will be sent to the farmers as previously, and these will be followed up by personal visits from the Inspector for a discussion on the report.

There can be no doubt but that the initiation of the Bingley Clean Milk Campaign has been well worth while, and

it is sincerely hoped that the trade will strive for even better results than those already achieved. The public too must do their share by increasing the consumption of milk and taking proper care of it in the home.

W.E.COOKE.
Senior Sanitary Inspector.

May, 1st, 1926.